



# UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/732,506	12/06/2000	Jean-Yves :Bouguet	06618/565001/CIT-3128	1153

20985 7590 03/11/2004

FISH & RICHARDSON, PC  
12390 EL CAMINO REAL  
SAN DIEGO, CA 92130-2081

EXAMINER

CHAWAN, SHEELA C

ART UNIT PAPER NUMBER

2625

DATE MAILED: 03/11/2004

7

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

09/732,506

Applicant(s)

BOUGUET ET AL.

Examiner

Sheela C Chawan

Art Unit

2625

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 23 August 2001.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-52 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-52 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 01 May 1101 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)  | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                                   | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |

**DETAILED ACTION**

***Preliminary Amendment***

1. Preliminary Amendment filed on Aug 30, 2001 has been entered.

***Drawings***

2. Drawings filed on 5/11/01 have been approved by examiner.

***Claim Objections***

3. Claim 46 is objected to because of the following informalities:

In claim 46, line 3, two " and " are repeated delete one and.

Appropriate correction is required.

***Claim Rejections - 35 U.S.C. § 102***

4. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless --

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1- 52 are rejected under 35 U.S.C. 102(b) as being anticipated by Raviv (US. 4,873,651).

As to claims 1, 12 and 36, Raviv discloses a method, comprising:

moving a shadow across a three-dimensional scene (fig 1A camera item 3, forms an image of the illuminated object and its shadow. The information gathered from the images generated by the camera from which the third-dimensional of the object can be determined, column 3, and lines 3-14);

imaging (fig 1A camera item 3) said moving shadow (column 3, lines 3-14); and determining three dimensional information about the scene from the moving shadow (fig 1A camera item 3, forms an image of the illuminated object and its shadow. The information gathered from the images generated by the camera from which the third- dimensional of the object can be determined, column 3, and lines 3-14).

As to claim 2, Raviv discloses a method wherein said imaging comprises using a camera to obtain an image of the moving shadow (fig 1A camera item 3, forms an image of the illuminated object and its shadow. The information gathered from the images generated by the camera from which the third- dimensional of the object can be determined, column 3, lines 3-14).

As to claims 3 and 28, Raviv discloses a method further comprising determining a transformation between an image plane of the camera and actual plane comprising the three-dimensional scene (column 6, lines 26- 67).

As to claim 4, Raviv discloses a method wherein said determining comprises triangulating to form information indicative of points on the three-dimensional scene. (column 7, lines 1-21).

As per claim 5, Raviv discloses a method comprising an initial operation of calibrating a position of a light source (column 2, lines 40- 68, column 3, lines 4 -30).

As to claim 6, Raviv discloses a method further comprising an initial operation of calibrated a position of a plane on which the three-dimensional scene is located (column 3, lines 4-30).

As to claim 7, Raviv discloses a method wherein said imaging said moving shadow comprises determining a shadow time at each of a plurality of image elements (column 8, lines 56- 66), and locating a projection of the shadow in a plane of a camera used to obtain an image of the moving shadow (column 3, lines 4-14).

As to claim 8, Raviv discloses a method further comprising converting said projection into actual shadow information (column 10, lines 38- 68).

As to claim 9, Raviv discloses a method wherein said calibrating a position of the light source comprises imaging an item of known height by defining a position of its shadow, and triangulating (column 9, lines 51-61) a position of the light source (column 7, lines 12-52).

As to claims 10 and 32, Raviv discloses a method wherein said determining comprises converting information into a dual-space representation, and calculating said information in said dual space representation (column 9, lines 25- 32, fig 6).

As to claim 11, Raviv discloses a method wherein said determining comprises obtaining images of different edges at different locations (column 6, lines 51-62, column 12, lines 11-18), and using information about the intersection to form three-dimensional information (column 7, lines 12-68).

As to claim 13, Raviv discloses a method wherein said additional information is a position of a light source (column 12, lines 11-18).

As to claim 14, Raviv discloses a method, wherein said additional information is a position of a reference plane (abstract, column 2, lines 41- 68).

As to claim 15, Raviv discloses a method wherein said reference plane is a single reference plane (column 3, lines 4-14).

As to claim 16, Raviv discloses a method wherein said additional information about said reference plane includes a position of two different reference planes (column 2, lines 41- 45).

As to claim 17, Raviv discloses a method wherein said additional information is information about a shadow of unknown object of known height (column 2, lines 41- 58).

As to claim 18, Raviv discloses a method wherein said additional information is information from a second light source (column 3, lines 4-33).

As to claim 19, Raviv discloses a method wherein said additional information is information from a second shadow (column 3, lines 4-33).

As to claim 20, Raviv discloses a method further comprising a calibration operation that determines a position of the reference plane (abstract, column 2, lines 41- 68).

As to claim 21, Raviv discloses a method wherein said converting comprises converting a projection of the shadow into actual shadow information (column 10, lines 22- 37, column 11, lines 35- 56).

As to claim 22, Raviv discloses a method further comprising obtaining an object of known high, obtaining as shadow of said object, and using said shadow to determine the position of the light source (column 10, lines 22- 37).

As to claim 23, Raviv discloses a method wherein said additional information is information, which propagates between edges of the image (column 6, lines 51- 62).

As to claim 24, Raviv discloses a method wherein said shadow is formed by two separate light sources (column 6, lines 2-7).

As to claim 25, Raviv discloses a method wherein said converting comprises defining said shadow as a set of edges  $C$ , and a set of intersection points  $p_k$  (column 6, lines 51- 62).

As to claim 26, claim 26 recites similar limitation as claim 1 above and similarly analyzed except for the step as taught by Raviv obtaining an image of the moving shadow at each of a plurality of times (column 6, lines 13- 23).

determining a relationship between the image and the three-dimensional surface at each of the plurality of times (column 8, lines 38-61); and

converting said image into information of the three dimensional surface (column 3, lines 4- 33).

As to claim 27, Raviv discloses a method wherein each image includes a line of the shadow, including a plurality of points  $p$ , which represent points  $P$  on the three-dimensional surface (column 7, lines 12- 68).

As to claim 28, Raviv discloses a method wherein said converting comprises triangulating between a reference plane of an imaging object and a reference plane of the three dimensional surface (column 2, lines 42- 68, column 3, lines 15- 33).

As to claim 29, Raviv discloses a method wherein said triangulating includes determining a position of a light source, and determining a reference plane between said light source and a line of the moving shadow (column 10, lines 60- 68, column 11, lines 9- 18).

As to claim 30, Raviv discloses a method wherein said converting comprises determining positions of horizontal and vertical reference planes (column 11, lines 10-18) and triangulating using said positions (column 7, lines 12- 38).

As to claim 31, Raviv discloses a method wherein said determining positions comprise determining positions of at least one plane by a calibration operation (column 10, lines 22- 37).

As to claim 32, Raviv discloses a method wherein said determining a position of a light source comprises using an object of known high to triangulating a position of a light source (column 9, lines 51-68), by obtaining a shadow of the object of known height (column 7, lines 12- 38).

As to claim 33, Raviv discloses a method wherein said converting comprises converting the information obtained into dual space, and calculating the values obtained in the dual space representation (fig 6, column 9, lines 25- 41).

As to claim 34, Raviv discloses a method wherein said converting comprises determining three-dimensional information about three points in the image, and determining all other points from said determining three points (column 3, lines 50- 65).

As to claim 35, Raviv discloses a method wherein said obtaining comprises using a camera to obtain said image, and wherein said converting comprises determining information about the camera reference plane and converting said image using said information about the camera reference plane (column 3, lines 15- 30).

As to claims 37, 44 and 48, Raviv discloses an apparatus wherein said processor carries out an operation to determine information in two orthogonal shadow planes, and



determining a position of a light source automatically from said information in said two orthogonal shadow planes (column 9, lines 2- 41).

As to claim 38, Raviv discloses an apparatus further comprising a memory, associated with said processor storing information obtained from camera calibration (camera has processor which stores information of object and then transmits to computer, column 5, lines 3-22).

As to claims 39 and 50, Raviv discloses an apparatus wherein said information stored in said memory comprises ground plane information (column 2, lines 58- 68, column 3, lines 1-3).

As to claims 40 and 51, Raviv discloses an apparatus wherein said memory also stores information indicative of a length of a device used to produce said moving shadow (abstract, column 2, lines 41- 52).

As to claim 41, Raviv discloses an apparatus wherein said memory also stores information about a profile of brightness intensity (column 10, lines 47- 59).

As to claim 42, Raviv discloses an apparatus wherein said memory also stores information about a threshold of brightness intensity (column 10, lines 47- 59).

As to claims 43 and 49 Raviv discloses an apparatus wherein said memory stores information about a location of a light source (column 5, lines 20- 22).

As to claims 45 and 52, Raviv discloses an apparatus wherein said processor processes only pixels of the image which have intensity values greater than said specified threshold (column 10, lines 60- 68, column 11, lines 1-8).

As to claim 46, Raviv discloses an apparatus wherein said processor uses said information in the memory to transform between an image plane of said camera and actual plane comprising the three-dimensional scene (column 5, lines 1-13).

As to claim 47, claim 47 recites similar limitation as claim 1 above and similarly analyzed except for the step as taught by Raviv detect a movement of the shadow in a sequence of two-dimensional images, across the three-dimensional scene (column 5, lines 23- 39); and

Use calibration information to determine information about the actual plane of the three-dimensional scene based on the transformation between the image plane of the device acquiring the two-dimensional image, and the three-dimensional scene (column 1, lines 21- 28, column 2, lines 22- 32).

***Other prior art cited***

5. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Crampton (US.6, 611,617 B1) discloses scanning apparatus and method.

Horii (US.5,850,463) discloses facial image processing method and facial image processing apparatus.

Goldwasser et al. (US.4,737,921) discloses three dimensional medical image display system.

Redmond (US.5,513,130) discloses methods and apparatus for generating and processing synthetic and absolute real time environments.

Kato (US.5,687,249) discloses method and apparatus for extracting features of moving objects.

**Contact Information**

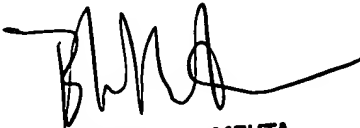
6. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Sheela C Chawan whose telephone number is 703-305- 4876. The examiner can normally be reached on Monday through Thursday 7.30 a.m. to 6.00 p.m.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Bhavesh Mehta, can be reached on (703) 308 - 5246. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-305-3800.

*See*

Sheela Chawan  
Patent Examiner  
Group Art Unit 2625  
March 5, 2004

  
BHAVESH M. MEHTA  
SUPERVISORY PATENT EXAMINER  
TECHNOLOGY CENTER 2800